

PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of

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Yasuyuki SANAI

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For: ACTIVE ENERGY BEAM-CURABLE COMPOSITION FOR OPTICAL MATERIAL

DECLARATION UNDER 37 C.F.R. § 1.132

Mail Stop Amendment
Commissioner for Patents
P.O. Box 1450
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Sir:

I, Yasuyuki SANAI, hereby declare and state that:

I am a citizen of Japan;

I am a graduate of the Graduate School of Engineering of Kansai University and have received a Master's Degree in March 1995;

Since April 1995, I have been employed by TOAGOSEI CO., LTD. and have been engaged in the study of polymer materials; and

I am the inventor of the invention described and claimed in the above-identified application, and I am familiar with the Office Action dated July 22, 2008.

To demonstrate the unexpected superiority of the present invention, the following experimentation was conducted by me or under my direct supervision.

Additional Comparative Experimental Data

Additional comparative experiments (Comparative Examples 3' to 6') that contain bis(4-methacryloylthiophenyl) sulfide (MPSMA) were tested.

Compositions of Examples 3 to 6 in Table A below are the same as compositions of Examples 3 to 6 in the present invention, respectively.

Compositions of Comparative Examples 3' to 6' in Table A were formed in the same manner as in Example 3 in the present invention except that the component (A) was replaced as described in Table A.

That is, respective components shown in Table A below were stirred and mixed according to an ordinary method, which were heated in a dryer having been maintained previously at 80°C over 15 minutes to dissolve a solid photoinitiator, thereby preparing a composition.

The obtained composition was evaluated by means of the following color in Hazen units (APHA) method. The result is listed in Table A below.

The color tone (APHA) was evaluated for the obtained composition in accordance with a testing method for color of chemical products (Part 1: estimation of color in Hazen units (platinum-cobalt scale)) of JIS K 0071.

Each of the obtained compositions was formed in the same manner as in Example 3 in the present invention. That is, each of the obtained compositions was applied to a transparent OPP film (biaxially stretched polypropylene film TK, manufactured by NIPPON POLYACE Co., LTD.) having a thickness of 50 μm by a bar coater at room temperature to give a thickness of 30

μm, which was cured by irradiating ultraviolet rays twice with a high-pressure mercury vapor lamp of an output power of 160 W/cm under the condition of a conveyer speed of 10 m/min and a lamp height of 10 cm.

The obtained cured article 1 was evaluated by means of the following appearance method. The result is listed in Table A below.

Appearance was evaluated in the same manner as in the Examples in the present invention.

Moreover, each of the obtained compositions was applied to a transparent polyethylene terephthalate (PET) film (A-4300 manufactured by TOYOBO CO., LTD.) having a thickness of 50 μm by a wire bar at room temperature to give a thickness of 50 μm, which was put between the transparent PET film and another of the same transparent PET film, which was then cured by irradiating ultraviolet rays of 96 mW/cm² in 60 seconds (total 5,760 mJ/cm²) through the transparent PET film.

The obtained cured article 2 was evaluated by means of the following saturation method. The result is listed in Table A below.

Tone of transmitted light was measured by a fast spectrophotometric transmittance meter DOT-3C manufactured by Murakami Color Research Laboratory, and was evaluated C* in L*C*h color system for the obtained cured article 2.

C* denotes a chroma of color, where the smaller a value of C* is, the more vivid the obtained cured article is, and the more excellent in transparency the obtained cured article is.

(Table A)

	Composition (part by weight)				Result		
	(A)	Other	(B)	(C)	Composition	Cured article	
	BAPS	MPSMA	o-PPA	Irg184	Color in Hazen units (APHA)	Appearance	Chroma (C*)
Ex. 3	20	—	80	1	50	Excellent	0.66
Ex. 4	30	—	70	1	60	Excellent	0.88
Ex. 5	40	—	60	1	80	Excellent	0.94
Ex. 6	50	—	50	1	100	Excellent	1.02
Comp. Ex. 3'	—	20	80	1	200	Excellent	0.33
Comp. Ex. 4'	—	30	70	1	250	Excellent	0.38
Comp. Ex. 5'	—	40	60	1	300	Excellent	0.55
Comp. Ex. 6'	—	50	50	1	300	Excellent	0.40

In Table A, abbreviated expressions have following meanings.

BAPS: bis(4-acryloyloxyphenyl) sulfide, a compound having hydrogen atoms as R₁-R₈ in formula (1) of the present invention

MPSMA: bis(4-methacryloylthiophenyl) sulfide, which is used in Examples of Fukushima et al.(US 5,969,867)

o-PPA: o-phenylphenyl acrylate, a compound having a hydrogen as R₉, an o-phenyl group as R₁₁, and n=0 in general formula (2) of the present invention

Irg184: 1-hydroxycyclohexylphenyl ketone, IRGACURE184, manufactured by Ciba Specialty Chemicals K.K.

The following points are clear from the results shown in Table A above.

Each of the compositions of Examples 3 to 6 of the present invention was not colored, and was excellent in transparency.

Each of the cured articles of Examples 3 to 6 of the present invention had a large value of C^* , and was excellent in appearance and transparency.

Each of the compositions of Comparative Examples 3' to 6' in Table A, which included MPSMA in place of the component (A) of the present invention, was colored, and was unfavorable.

Each of the cured articles of Comparative Examples 3' to 6' in Table A, which included MPSMA in place of the component (A) of the present invention, had a small value of C^* , and was poor in transmittance.

Therefore, an optical material of the present invention is especially excellent in transparency, and Fukushima et al. does not teach or suggest the present invention. I conclude that the present invention provides unexpectedly superior results.

I declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

Date: _____

By: _____
Yasuyuki SANAI